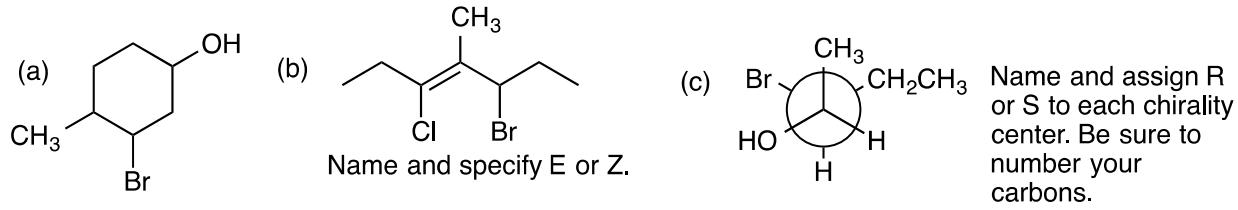
Final Exam - Long Island University

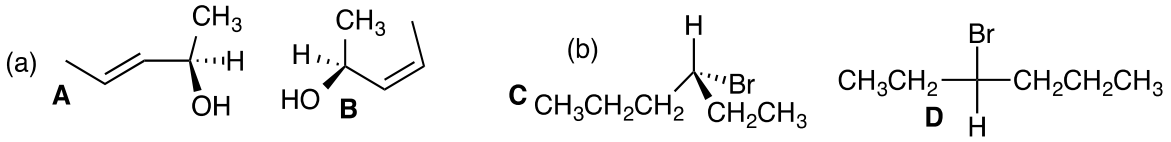
Chem. 121, Sect, 003, 005, 006 Fall, 2016, 250 points

1. Name the following molecules. (30 pts)



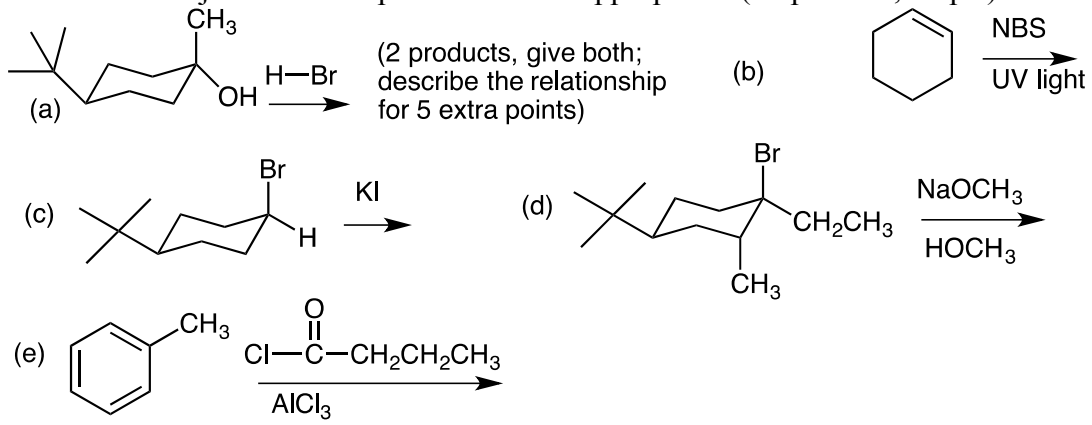
2. Draw the following molecules (a) the sawhorse and Newman projections of the low energy configuration of 2,5-dimethylhexane looking down the C3-C4 bond. (b) Z-2R-3-hexen-2-ol. (c) All the stereoisomers of 2,3-dibromobutane. (30 pts).

3. Give the relationship between the following pairs of molecules. They may be the same molecule, enantiomers, diastereomers, or constitutional isomers. (10 pts)

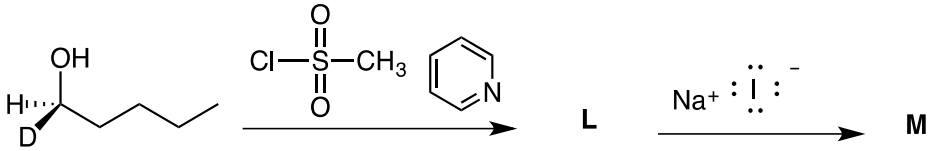


4. Which molecule would have the **LOWER** heat of combustion, *cis*- or *trans*-1-isopropyl-3-methylcyclohexane? Briefly explain your answer. You must make careful three-dimensional chair drawings of **BOTH** conformations of each molecule, showing clearly the ring flip. (15 pts)

5. Give the product(s) of the following reactions, **<u>showing the full reaction mechanism</u>** in each case and the major and minor products where appropriate. (15 pts each, 75 pts)

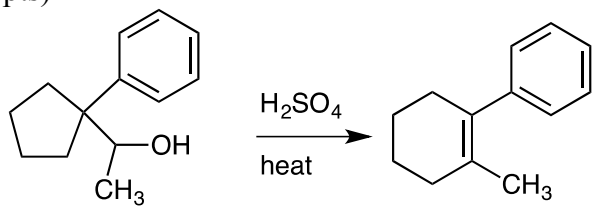


6. (a) Give the product of the following reaction, showing the complete reaction mechanism for step 2. For the first step just show the product **L**. (b) If the starting material is optically active, is the product optically active? Briefly explain your reasoning. (15 pts)

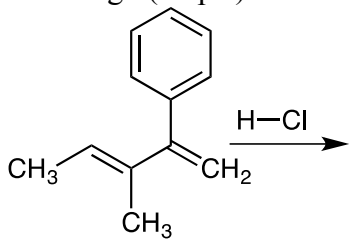


7. Which reaction, **N** or **O**, would give the most elimination product? Which one would give the most substitution product? In each case, briefly justify your choice and show the complete reaction that occurs and the product. (20 pts)

8. Show how the following rearrangement reaction occurs, giving all of the steps of a reasonable mechanism. No other reagents are needed other than the sulfuric acid given over the arrow. (10 pts)



9. For the following reaction **FOUR** constitutional isomers are formed (disregard stereoisomers). (a) Show all of them and show the complete reaction mechanism by which each is formed. HINT: consider react at **EACH** double bond. (b) Two of the products are favored at lower temperature and two at higher temperatures. Indicate which products these are and briefly explain your reasoning. (15 pts)



10. Synthesize **THREE** of the following **FOUR** molecules form the starting materials given on the LEFT. Do all **four** for extra credit. (30 pts)